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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/733,217 | 12/11/2003 | Axel Brintzinger | 2002 P 12234 US | 8003 |
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| SLATER & MATSIL LLP 17950 PRESTON ROAD SUITE 1000 DALLAS, TX 75252 | | | | |
| | | | EXAMINER THOMAS, TONIAE M | |
| | | | ART UNIT 2822 | PAPER NUMBER |

DATE MAILED: 10/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/733,217

Applicant(s)

BRINTZINGER ET AL.

Examiner

Toniae M. Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3,4,6,7,9-13 and 16-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3,4,6,7,9-13 and 16-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is responsive to the amendment filed on 14 July 2006.
2. Currently, claims 3, 4, 6, 7, and 9-13, and 16-29 are pending.
3. Upon further consideration, the indicated allowability of claims 3, 7, and 15 is withdrawn in view of the previously cited reference to Khandros et al. (US 2004/0201074 A1). A rejection based on the Khandros et al. reference follows.

Claim Objections

4. Claims 23-25 are objected to because of the following informalities: the letter "o" after "surface" and before "the wafer" should be "of" (claim 23, line 3). Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. *Claim 28 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.*

Claim 28 as presented in the amendment filed on 14 July 2006 recites the limitation "said step of exposing an underlying surface." Claim 7 does not

provide antecedent basis for "said step of exposing an underlying surface" as recited in claim 28.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. *Claims 3, 4, 7, 9-13, and 16-26, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khandros et al. (US 2004/0201074 A1) in view of Klocke et al. (US 2003/0057093 A1).*^{1,2}

The Khandros et al. application publication (referred to hereinafter as Khandros) discloses a method of forming a plurality of three-dimensional structures on a substrate (see fig. 1 and accompanying text). The method comprises the steps of: providing a wafer 116 with bumps, compliant elements 110, distributed on a surface of the wafer (fig. 1; par. 0058, lines 1-4; and par. 0063, lines 1-3); forming a sacrificial layer over the surface including the bumps, and patterning the sacrificial layer to expose and underlying seed layer

¹ The Klocke et al. patent was relied upon in the previous Office action mailed on 20 April 2006.

² Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

(par. 0073, lines 1-8 and par. 0074, lines 1-3); and forming a plurality of conductors 102 over the exposed seed layer, wherein the conductors electrically connect pads 114 to terminals 104 (fig. 1; par. 0063, lines 3-16; and par. 0074, lines 5-7). Khandros further teaches that the sacrificial layer may be an electrophoretic resist (par. 0073, lines 5-8).

While Khandros teaches that the sacrificial layer can be an electrophoretic resist, Khandros does not explicitly teach forming the electrophoretic resist by: dipping the surface of the wafer into the electrophoretic resist; and applying an electrical voltage between the wafer and the electrophoretic resist.

The Klocke et al. application publication (referred to hereinafter as Klocke) discloses a method of depositing an electrophoretic resist on microelectronic workpieces (par. 9, lines 10-14). The electrophoretic resist is formed by: placing a workpiece into an electrophoretic resist; applying an electrical voltage between the substrate and the electrophoretic resist, while the workpiece is in the electrophoretic resist; and subsequently removing the workpiece from the electrophoretic resist (fig. 17; par. 091, lines 1-19; and par. 0111, lines 1-3). In one embodiment, the method further comprises protecting the rear surface of a workpiece from wetting while the workpiece is placed in the electrophoretic resist (par. 0033, lines 12-18 and par. 48, lines 13-19).

In one embodiment, the method further comprises causing the workpiece to be moved relative to the electrophoretic resist while the workpiece is placed

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in the electrophoretic resist (par. 0049, 1-5; par. 0051, 1-5; and par. 0091, lines 9-19). The workpiece is rotated while the workpiece is placed in the electrophoretic resist (par. 0049, lines 1-5; par. 0051, lines 1-5; and par. 0091, lines 9-19). In one embodiment, the electrophoretic resist is stirred while the workpiece is placed in the electrophoretic resist (par. 0049, lines 5-6). The surface of the wafer is dipped into the electrophoretic resist in a horizontal arrangement of the wafer (fig. 2 and par. 0079). The method further comprises heating the workpiece after removing the workpiece from the electrophoretic resist (par. 112, lines 8- 18).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to form the electrophoretic resist in Khandros by the method comprising placing a workpiece into an electrophoretic resist, applying an electrical voltage between the substrate and the electrophoretic resist while the workpiece is in the electrophoretic resist, and subsequently removing the workpiece from the electrophoretic resist, as taught by Klocke, because: despite the uneven topography created by the bumps, the coating of resist resulting therefrom conforms uniformly to surface of the wafer.

7. *Claims 6 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khandros in view of Klocke as applied to claims 3 and 13 above, and further in view of Brooks et al. (US 6,084,297).³*

³ The Brooks et al. patent was relied upon in the previous Office action mailed on 20 April 2006.

As explained above, Khandros discloses forming a plurality of conductors 102 over the exposed seed layer. The plurality of conductors may comprise a gold layer formed over a nickel layer (par. 0063, lines 3-10 and par. 0074, lines 5-11).

The Brooks et al. patent (referred to hereinafter as Brooks) discloses forming a plurality of conductors 32 (fig. 1 and col. 5, lines 46-49). The plurality of conductors comprises a copper layer, a nickel layer formed over the copper layer, and a gold layer formed over the nickel layer (col. 5, lines 50-53).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the combination of Khandros and Klocke by forming a copper layer over the exposed seed layer prior to forming the nickel layer, as taught by Brooks, since copper has excellent conductivity and can be selectively deposited onto the exposed seed layer using an electroplating method.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-

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9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TMT

30 September 2006



M. Wilczewski
Primary Examiner
TC 2800